

**Agilent Technologies**

Innovating the HP Way

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# SMPTE 310M Interface Installation Guide

Product Number: E6292A

Document Part Number: E6292-94000 Ed2

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**MPEGscope**

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**Printing history**

New editions of this guide are issued to reflect extensive changes made to the software. Revisions may be issued between editions to correct errors in the manual. A new edition may not be issued with every application release. The application release, at the date of printing, is noted in the following table.

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Product Number: E6292A

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April, 1999	E6292-94000 Ed1
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**Product support**

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## Certification

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology (formerly National Bureau of Standards), to the extent allowed by that organization's calibration facility, and to the calibration facilities of other International Standards Organization members.

## Additional Information for Test and Measurement Equipment

To comply with EMC regulations, shielded cables should be used on all appropriate connections. Otherwise, the user has to ensure that, under operating conditions, the Radio Interference Limits are still met at the border of the user's premises.

## Warnings

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

**Ground the Equipment:** For safety, Class 1 equipment (equipment having a protective earth terminal), an uninterruptible safety ground must be provided from the mains power source to the product input wiring terminals or supplied power cable. Before operating the equipment, guard against electric shock in case of fault by always using the provided 3-conductor power cord to connect the equipment to a grounded power outlet.

**DO NOT use in hazardous environments:** Do not operate the product in an explosive atmosphere or in the presence of flammable gases or fumes. This product is designed for indoor use only.

**DO NOT use repaired fuses or short-circuited fuse holders:** For continued protection against fire, replace line fuses only with fuses of the same voltage and current rating and type.

**Keep away from live circuits:** Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers and shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.

**DO NOT operate damaged equipment:** Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to an Agilent Technologies Sales and Service Office for service and repair to ensure the safety features are maintained.

**DO NOT substitute parts or modify equipment:** Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Technologies Sales and Service Office for service and repair to ensure features are maintained.

**DO NOT clean with fluids:** Doing so may make the equipment unsafe for use. Power down the equipment and disconnect the power cord before cleaning. To clean, use a soft dry cloth.

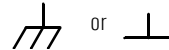
## Safety Symbols



If you see this symbol on a product, you must refer to the manuals for specific Warning or Caution information to avoid personal injury or damage to the product



Indicates the field wiring terminal that must be connected to ground before operating the equipment. Protects against electrical shock in case of fault.



Frame or chassis ground terminal. Typically connects to the equipment's metal frame.



Alternating current (ac).



Direct current (dc).



Indicates hazardous voltages and potential for electrical shock.



Indicates that antistatic precautions should be taken.



This product complies with CSA requirement CSA 22.2 No. 1010.1, NRTL/C, EN 61010-1:1993 + A2:1995/IEC 1010-1:1990 + A1:1992 + A2:1995 Safety requirements for electrical equipment for measurement, control, and laboratory use.



Notice for European Community: This product complies with the relevant European legal Directives: EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC.

Das CE-Zeichen zeigt die Übereinstimmung mit allen für das Produkt geltenden Direktiven der Europäischen Union an.

## ISM 1—A

This is the symbol for an Industrial, Scientific, and Medical Group 1 Class A product.

Dieses Zeichen steht für ein Produkt der Gruppe 1, Klasse A, für den Einsatz im industriellen, wissenschaftlichen und medizinischen Bereich.



This product meets the requirements of the Australian EMC Framework (AS/NZS 2064.1/2 for ISM:1A), enforced by the Radiocommunications Act 1992.

### WARNING

Calls attention to a procedure, practice, or condition that could cause bodily injury or death.

### CAUTION

Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

### Certification

Agilent Technologies certifie que cet instrument est conforme aux spécifications publiées au moment de sa sortie d'usine. Agilent Technologies atteste en outre qu'il est possible de trouver référence à ses mesures d'étalonnage auprès de l'organisme de normalisation américain "United States National Institute of Standards and Technology" (auparavant National Bureau of Standards), dans la mesure des possibilités autorisées par cet organisme, et dans celles autorisées par d'autres membres de l'Organisation Internationale de Normalisation.

### Informations complémentaires relatives à l'équipement de test et de mesure

Conformément aux réglementations concernant la compatibilité électromagnétique, il convient d'utiliser des câbles blindés sur toutes les connexions appropriées. S'il n'emploie pas ce type de câble, l'utilisateur doit vérifier qu'en condition d'exploitation les interférences radio sont encore acceptables à la limite de ses locaux.

### Avertissement

Les précautions générales de sécurité ci-dessous doivent être observées au cours de toutes les phases d'exploitation, de maintenance et de réparation de l'instrument. Le non-respect de ces précautions ou d'avertissements spécifiques cités ailleurs dans le manuel entraîne la violation des normes de sécurité relatives à la conception, la fabrication et l'utilisation prévue de cet instrument. Agilent Technologies n'assume aucune responsabilité en cas de non-respect de ces exigences.

Mise à la terre de l'équipement: en vue de garantir la sécurité, pour l'équipement de classe 1 (comportant une borne mise à la terre de protection), une mise à la terre permanente doit être assurée de la source d'alimentation secteur aux bornes de câblage d'entrée de l'instrument ou au câble d'alimentation fourni. Avant d'utiliser l'équipement, évitez les chocs électrostatiques en cas de défaillance de l'instrument en utilisant toujours le cordon d'alimentation 3 conducteurs fourni pour brancher l'équipement à une prise de terre.

N'UTILISEZ PAS dans un environnement à risque : N'utilisez pas l'instrument dans des conditions de risques d'explosion ni en présence de gaz ni d'émanations inflammables. Cet instrument est conçu exclusivement pour un usage intérieur.

N'UTILISEZ PAS de fusibles usagés ni de porte-fusibles en court-circuit: Pour une protection permanente contre le feu, remplacez les fusibles uniquement par des fusibles de même tension, de même calibre et de même type.

Tenez vous à l'écart des circuits sous tension: Le personnel d'exploitation ne doit pas retirer les capots ni les blindages. Les procédures impliquant ces manipulations doivent être exécutées exclusivement par un personnel formé à la maintenance. Dans certaines conditions, des tensions dangereuses peuvent être générées même lorsque l'équipement n'est pas sous tension. Afin d'éviter tout risque d'électrocution, N'EXÉCUTEZ PAS de procédure nécessitant la manipulation des capots et des blindages sans qualification à cet effet.

N'UTILISEZ PAS d'équipement endommagé: Si les caractéristiques de l'instrument relatives à la sécurité ont été atteintes, que ce soit en raison d'un dommage physique, d'une humidité excessive, ou pour toute autre cause, METTEZ L'EQUIPEMENT HORS TENSION et ne l'utilisez plus jusqu'à ce que la sécurité de son fonctionnement puisse être vérifiée par un personnel formé à la maintenance. Si nécessaire, retournez l'instrument à un bureau commercial et de service après-vente Agilent Technologies pour le faire réparer et garantir ses caractéristiques de sécurité.

NE REMPLACEZ PAS de pièce ni ne modifiez l'équipement: En raison des risques supplémentaires que cela implique, n'installez pas de pièce de remplacement ni n'exécutez aucune modification non autorisée sur l'instrument. Retournez-le à un bureau commercial et de service après-vente Agilent Technologies pour le faire réparer et garantir ses caractéristiques de sécurité.

NE NETTOYEZ PAS avec des produits liquides: L'emploi de produits liquides peut être risqué. Mettez l'équipement sous tension et débranchez le cordon d'alimentation avant le nettoyage. Utilisez un chiffon doux et sec.

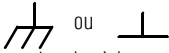
### Symboles de sécurité



Si vous apercevez ce symbole sur un instrument, vous devez vous référer aux manuels pour de plus amples informations concernant les notes Avertissement et Attention en vue d'éviter des blessures corporelles ou des dommages à l'instrument.



Indique la borne de câblage qui doit être connectée à la terre avant la mise en route de l'équipement. Protège contre les électrocutions en cas de défaillance de l'instrument.



Borne de mise à la terre de cadre ou de châssis. Connectée en principe au cadre métallique de l'équipement.



Courant alternatif (ca).



Courant continu (cc).



Indique une tension dangereuse et des risques d'électrocution.



Indique que des précautions anti-statiques doivent être prises.



Cet instrument satisfait aux spécifications CSA 22.2 No. 1010.1, NRTL/C, EN 61010-1:1993 + A2:1995/IEC 1010-1:1990 + A1:1992 + A2:1995 en matière de sécurité pour les équipements électriques de mesure, de contrôle et de laboratoire.



Label européen: cet instrument est conforme aux directives européennes suivantes: EMC 89/336/EEC et basse tension 73/23/EEC.

Das CE-Zeichen zeigt die Übereinstimmung mit allen für das Produkt geltenden Direktiven der Europäischen Union an.

## ISM 1—A

Ce symbole indique que l'instrument est un instrument de type Industriel Scientifique et Médical Groupe 1 Classe A.

Dieses Zeichen steht für ein Produkt der Gruppe 1, Klasse A, für den Einsatz im industriellen, wissenschaftlichen und medizinischen Bereich.



Cet instrument est conforme aux spécifications de l'Australian EMC Framework (AS/NZS 2064.1/2 for ISM:1A), mises en oeuvre par le Radiocommunications Act de 1992.

### AVERTISSEMENT

Attire l'attention sur une procédure, pratique ou condition comportant un risque de blessure ou d'électrocution.

### ATTENTION

Souligne qu'une procédure, pratique ou condition peut entraîner des dommages à l'équipement ou la perte permanente de données.



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## Introduction

The E6292A SMPTE (Society of Motion Picture and Television Engineers) 310M interface is serial-to-parallel converter that receives a synchronous serial SMPTE signal and converts it to a DVB-Synchronous Parallel Interface (DVB-SPI) signal. This DVB-SPI signal is then output to the DVB-SPI receiver on the MPEGscope main card via an external cable which is included with your installation kit. The SMPTE 310M interface enables you to test the connectivity of multiplexers and transmission equipment carrying ATSC-compliant transport streams.

This manual shows how to install the SMPTE 310M interface card into your MPEGscope Plus, MPEGscope Lite, MPEGscope Portable, or MPEGscope Portable Lite test system. Each step provides photographs and easy-to-understand explanations. The manual also includes illustrations and physical specifications for the interface and connectors.

### Installation kit

Before beginning, ensure that your SMPTE 310M interface installation kit contains the following items:

- SMPTE 310M Interface Installation Guide (E6292-94000)
- SMPTE 310M Interface Printed Circuit Assembly (E6292-66501)
- DVB-SPI Y-Adapter Cable (E6292-64300)
- Size 15 Torx Head Screwdriver (8710-1622)
- Antistatic Wrist Strap (9300-1408)

## Introduction

### For more help...

If you have any questions about the installation procedure, call your local HP representative. You can also contact digital video customer support at the following numbers:

<b>Location</b>	<b>Number</b>
North, Central, South America	1 800 698 0061 <i>or</i> (719) 531 4589
Asia-Pacific	1 800 375 8100 <i>or</i> (65) 272 5293
Europe, Africa, Middle East	+31 20 547 9900 <i>or</i> +33 69 29 41 14
Japan	0120 421 345 <i>or</i> +81 426 56 7799

If you prefer to email your question, please write to digital video customer support at this address:

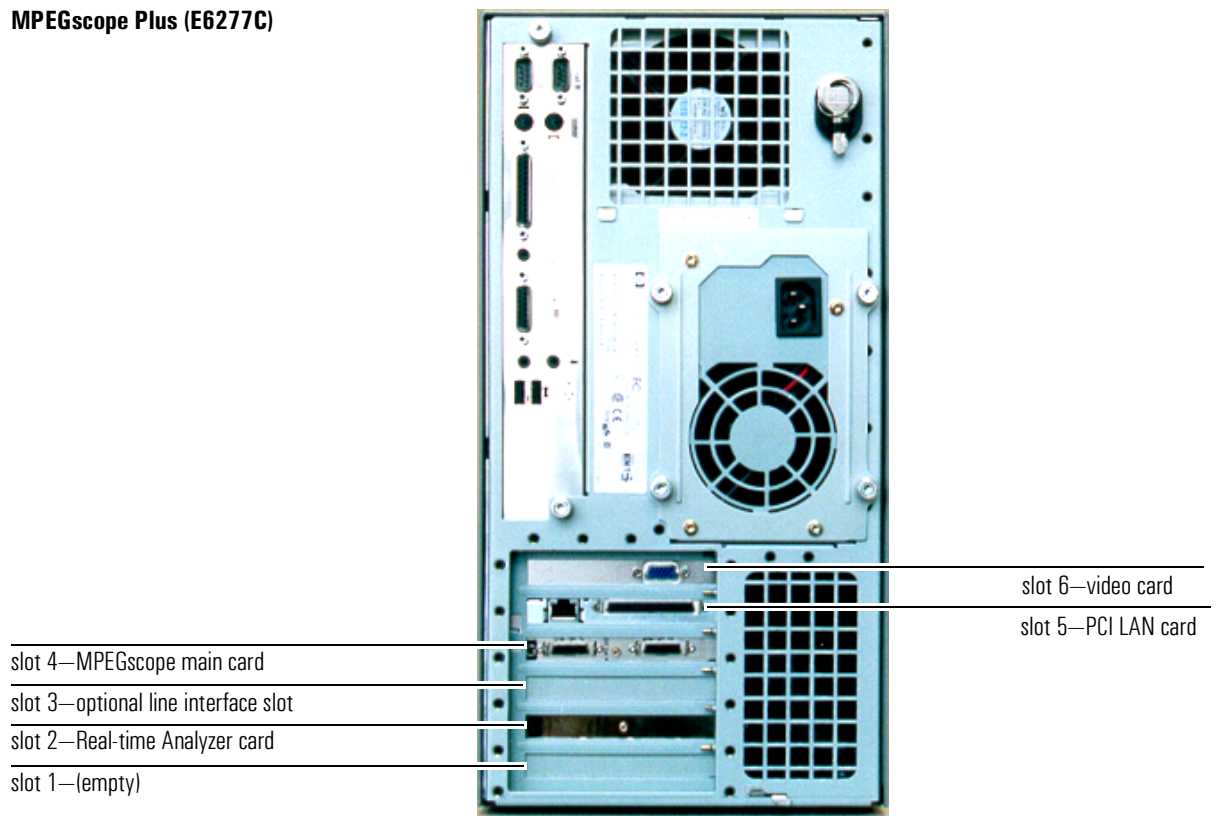
Email [dv-support@hp.com](mailto:dv-support@hp.com)

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## MPEGscope Plus and MPEGscope Lite

This section explains how to install the SMPTE 310M interface into the MPEGscope Plus or Lite models. Normally, you will install the interface into slot 3, the optional line interface slot. If you have a different MPEGscope PC than the one illustrated below, you can still follow the procedure described in this section, as the affected cards are installed in the same slot positions.

### MPEGscope Plus (E6277C)




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### Note

If your MPEGscope is housed in a Kayak XU PC and you also have another optional interface (such as the ASI & Serial ECL (DHEI) interface), you can rearrange the cards so that both the SMPTE 310M and the optional interface are installed at the same time. This alternative configuration is shown on page 9.

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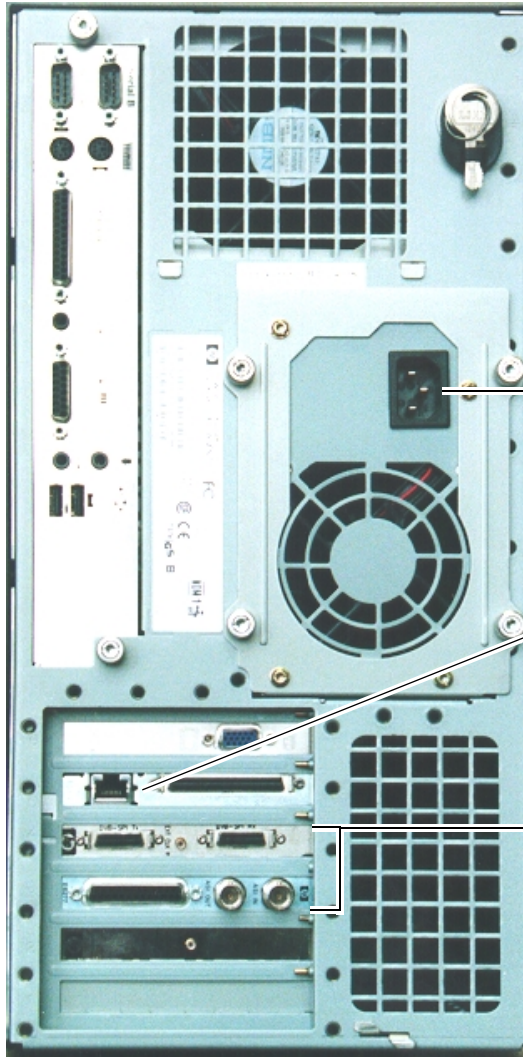
## Step 1: Remove the cover

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### WARNING

Never remove the computer cover without first removing the power cord from the power outlet and any connection to a telecommunications network.

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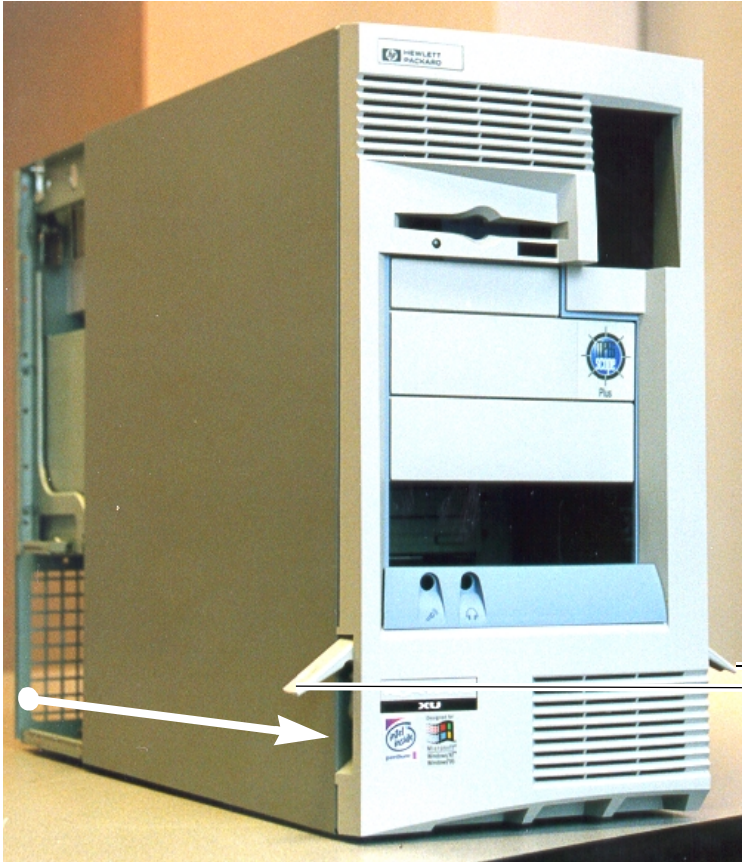


① Power off your PC.

② Unplug the AC power cord from the rear of the PC.

③ If you are connected to a telecommunications network, disconnect the network cable.

④ If you are connected to a system under test, disconnect the line interface cable(s).



⑤ Flip the two latches on the front sides of the computer cover upwards.

⑥ Grasp the cover on the sides at the back of the computer and slide it forwards and off the computer.

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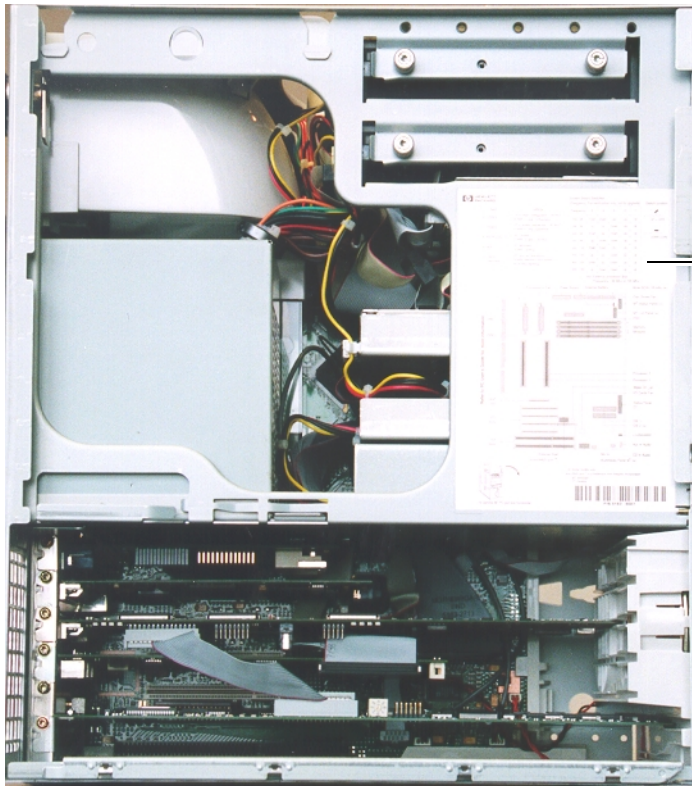
## Step 2: Remove optional interface

Complete this step if your MPEGscope already has an optional interface installed and you want to replace it with the SMPTE 310M interface. For an alternative card configuration, refer to page 9.

### IMPORTANT:

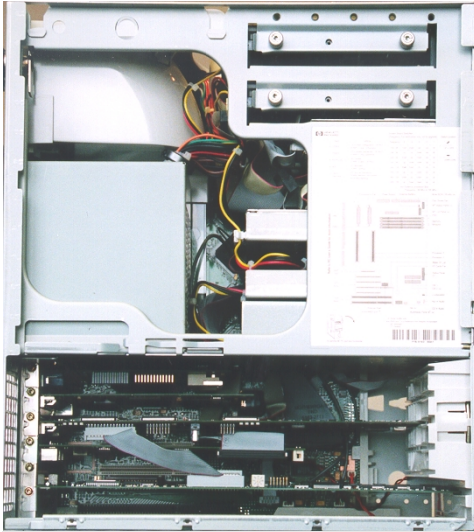
- ① Attach the antistatic wrist strap to your wrist and to the PC chassis as described in the instructions on the envelope. Ensure that the copper foil end of this strap attaches to an electrical ground.

Back of computer  
with connectors and  
faceplates



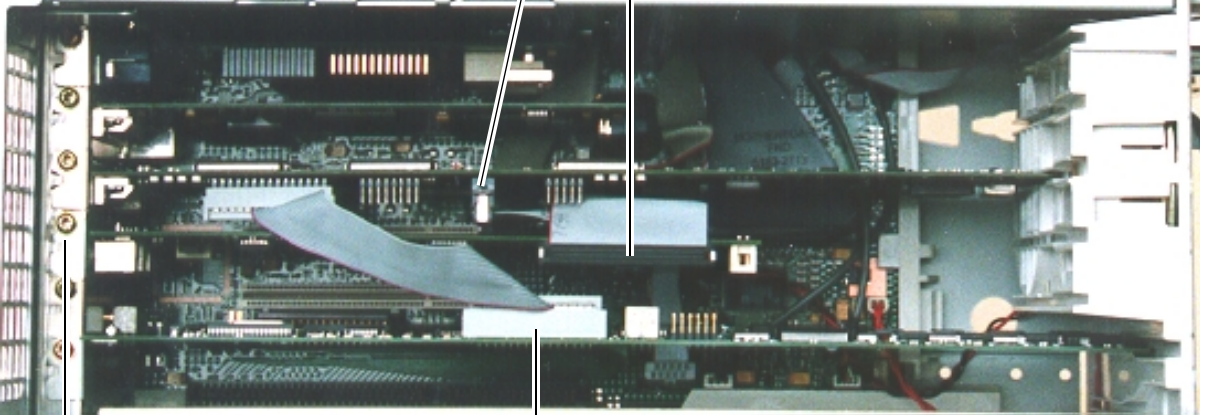
- ② Lay the computer on its side so that you can access the top of the cards.





⑥ If your optional line interface is connected to the MPEGscope main card with a cable, disconnect the other end of the cable from the MPEGscope main card and remove the cable.

④ If your optional line interface is connected to the MPEGscope main card with a cable, disconnect the cable from the optional interface card.



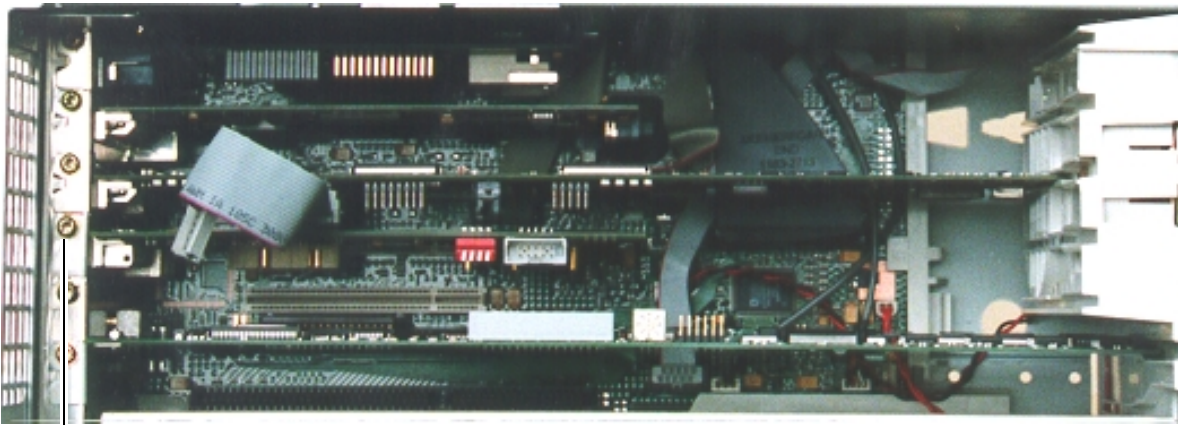
⑤ Remove the faceplate screw from slot 3 with the screwdriver provided, then remove the optional line interface.

③ If your MPEGscope has a Real-time Analyzer, disconnect the ribbon cable from the Real-time Analyzer card. The cable runs from the MPEGscope main card to the Real-time Analyzer card.

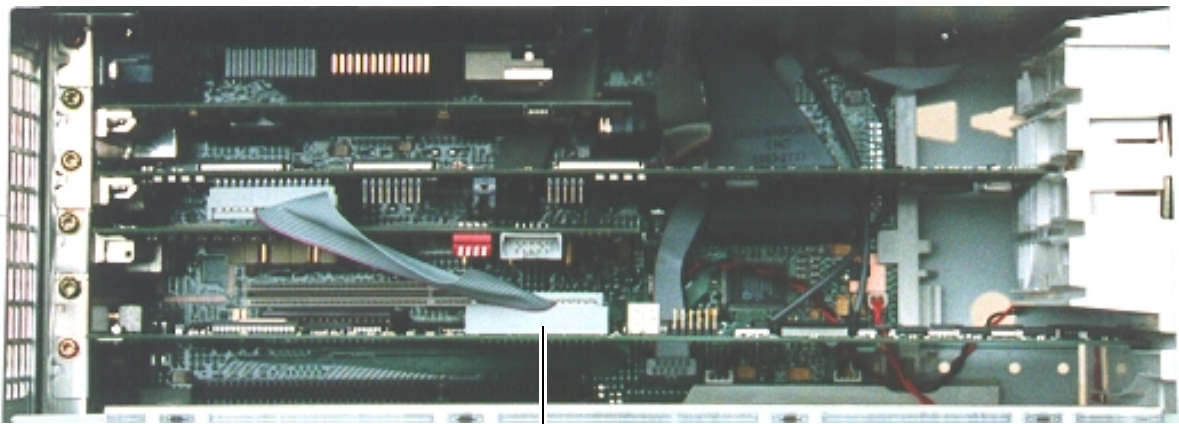
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### Step 3: Install SMPTE interface

**IMPORTANT:** ① Attach the antistatic wrist strap to your wrist and to the PC chassis as described in the instructions on the envelope. Ensure that the copper foil end of this strap attaches to an electrical ground.



② Install the SMPTE 310M interface card into slot 3 and screw the faceplate to the PC chassis. (If this is the first interface installed into slot 3, you will have to remove the blank faceplate first.)



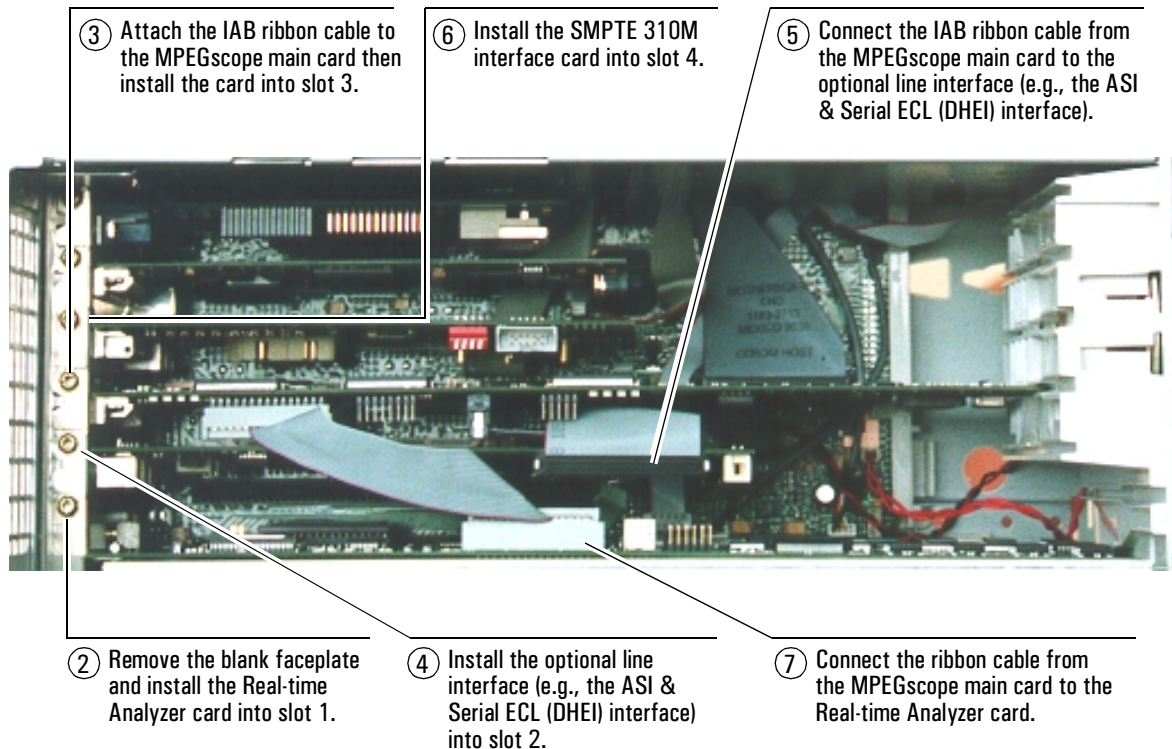
③ If your MPEGscope has a Real-time Analyzer, reconnect the ribbon cable from the MPEGscope main card to the Real-time Analyzer card.



**Alternative configuration**

This configuration applies only if your MPEGscope is housed in a Kayak XU PC (e.g., E6277B or E6277C). It enables you to have both the SMPTE 310M interface and another optional line interface (e.g., the ASI & Serial ECL (DHEI) interface) installed at the same time. The configuration requires repositioning all MPEGscope cards into the first four slots, and replaces Steps 2 and 3 on pages 6 to 8. Follow all other steps as usual.

- ① Remove the cards from slots 2, 3 and 4, disconnecting cables as necessary.



③ Attach the IAB ribbon cable to the MPEGscope main card then install the card into slot 3.

⑥ Install the SMPTE 310M interface card into slot 4.

⑤ Connect the IAB ribbon cable from the MPEGscope main card to the optional line interface (e.g., the ASI & Serial ECL (DHEI) interface).

② Remove the blank faceplate and install the Real-time Analyzer card into slot 1.

④ Install the optional line interface (e.g., the ASI & Serial ECL (DHEI) interface) into slot 2.

⑦ Connect the ribbon cable from the MPEGscope main card to the Real-time Analyzer card.

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## Step 4: Replace the cover



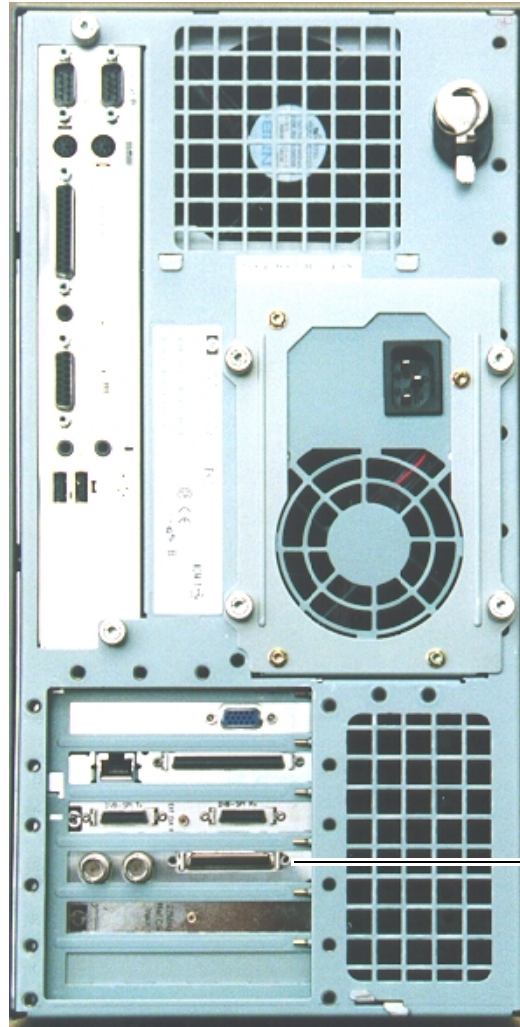
- ② Slide the cover onto the computer, making sure that the two guides at the bottom of the case slide into the two rails at the base of the computer. Firmly slide the cover backwards into position.

- ① Ensure that the two latches on the front sides of the cover are lifted up.

- ③ Lower the two latches on the front sides of the cover into place.

- ④ Reconnect your mouse, keyboard, display, power cables, and LAN connection, then power on your MPEGscope.

**MPEGscope Plus with SMPTE 310M interface installed**



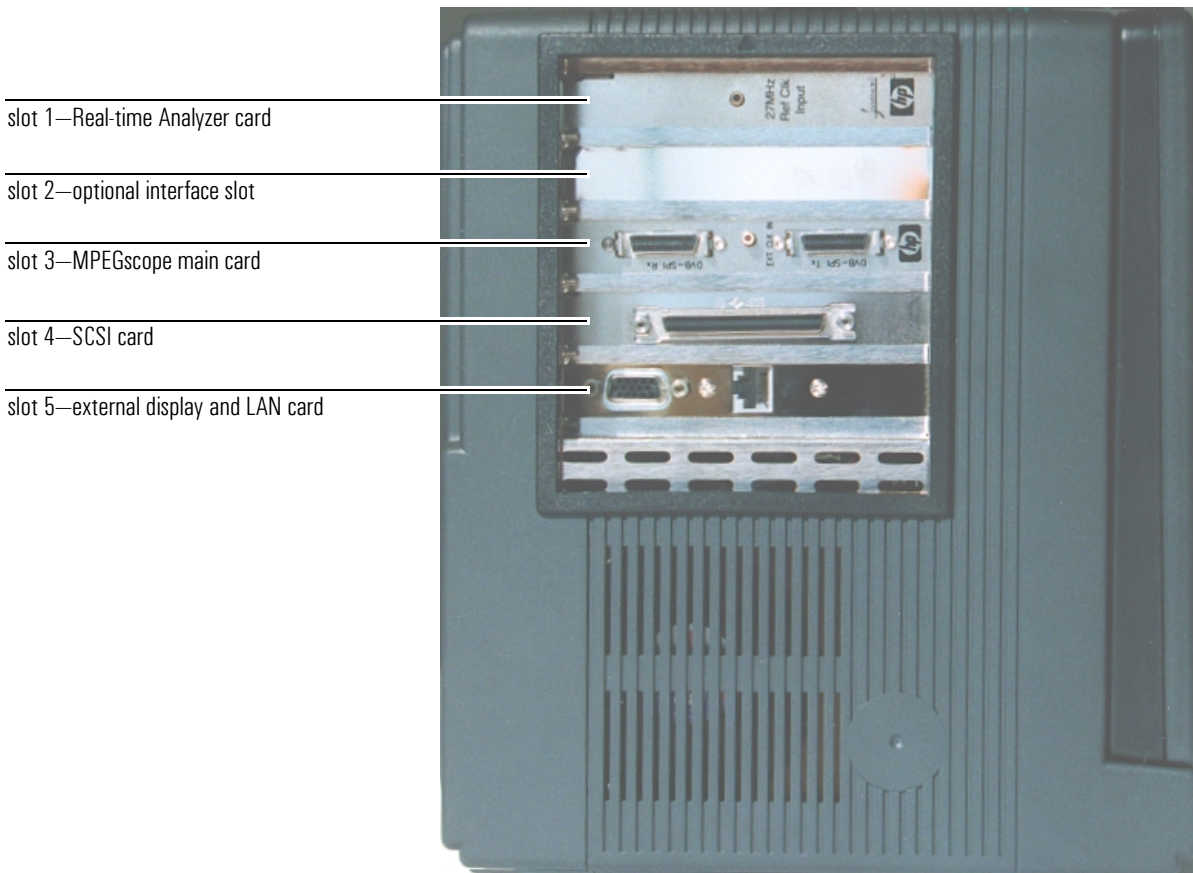
SMPTE 310M interface  
installed in slot 3.

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## MPEGscope Portable and Portable Lite

This section explains how to install the SMPTE 310M interface into the MPEGscope Portable or Portable Lite models. You will install the interface into slot 2, the optional line interface slot, illustrated below.

### E6300C MPEGscope Portable platform





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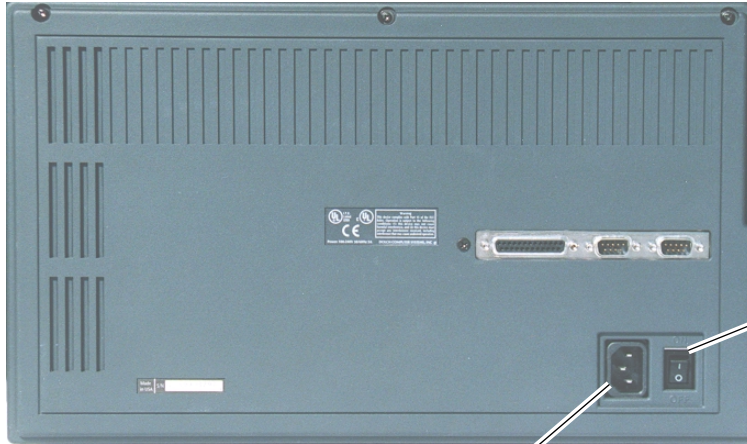
## Step 1: Remove the cover

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### WARNING

Never remove the computer cover without first removing the power cord from the power outlet and any connection to a telecommunications network.

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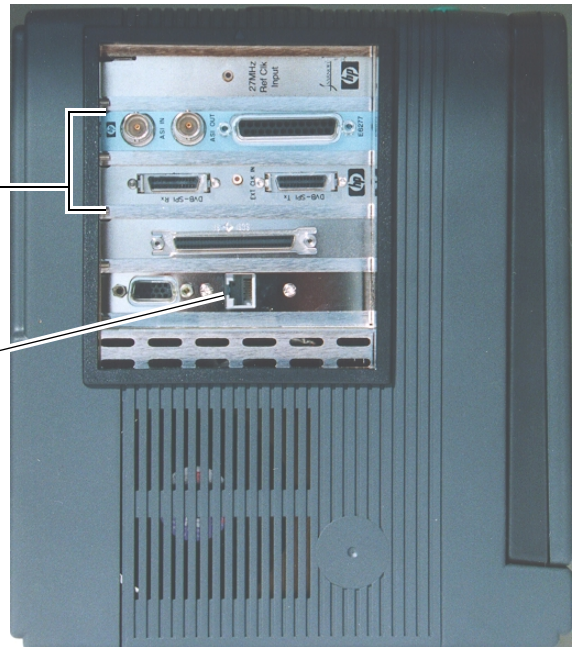


① Power off your portable.

② Unplug the AC power cord from the rear of the portable.

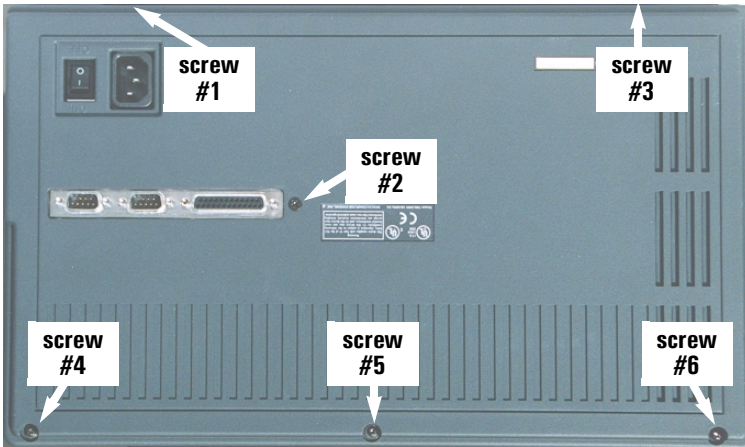
③ If you are connected to a system under test, disconnect the line interface cable(s).

④ If you are connected to a telecommunications network, disconnect the network cable.



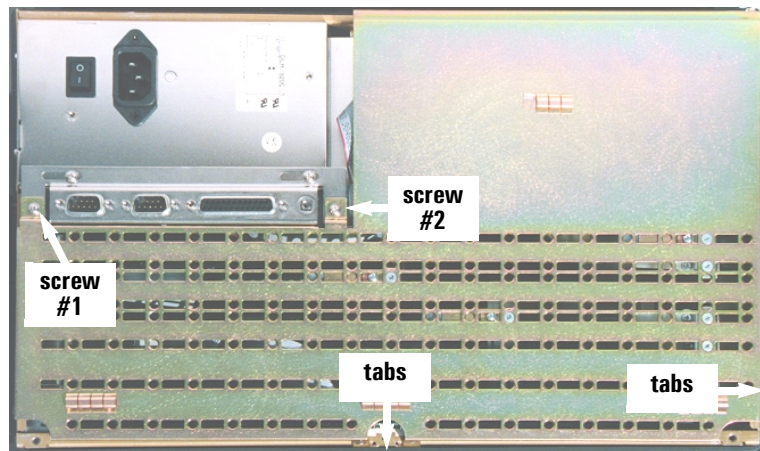
## MPEGscope Portable and Portable Lite

- ⑤ Carefully lay MPEGscope Portable face down with the handle towards you.



- ⑥ Remove the six back panel screws from the back and side, then lift off the back panel.

- ⑦ Remove the two metal shield screws, then gently pull tabs from slots and remove the metal shield.



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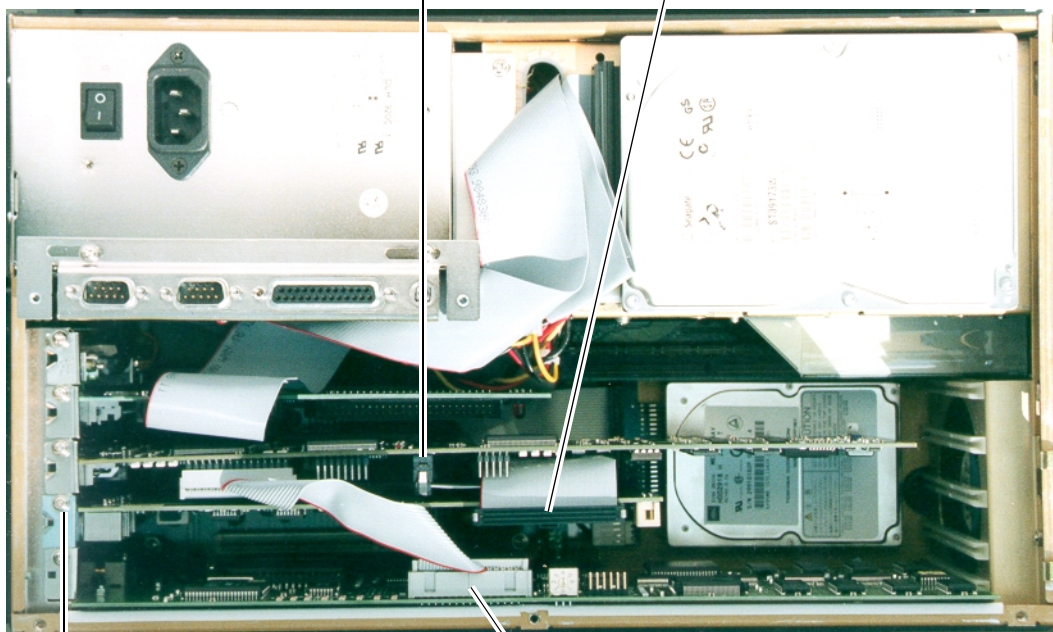
## Step 2: Remove optional interface

Complete this step if your MPEGscope already has an optional interface installed and you want to replace it with the SMPTE 310M interface.

**IMPORTANT:** ① Attach the antistatic wrist strap to your wrist and to the PC chassis as described in the instructions on the envelope. Ensure that the copper foil end of this strap attaches to an electrical ground.

⑤ If your optional line interface is connected to the MPEGscope main card with a cable, disconnect the other end of the cable from the MPEGscope main card and remove the cable.

③ If your optional line interface is connected to the MPEGscope main card with a cable, disconnect the cable from the optional interface card.



④ Remove the faceplate screw from slot 2 with the screwdriver provided, then remove the optional line interface.

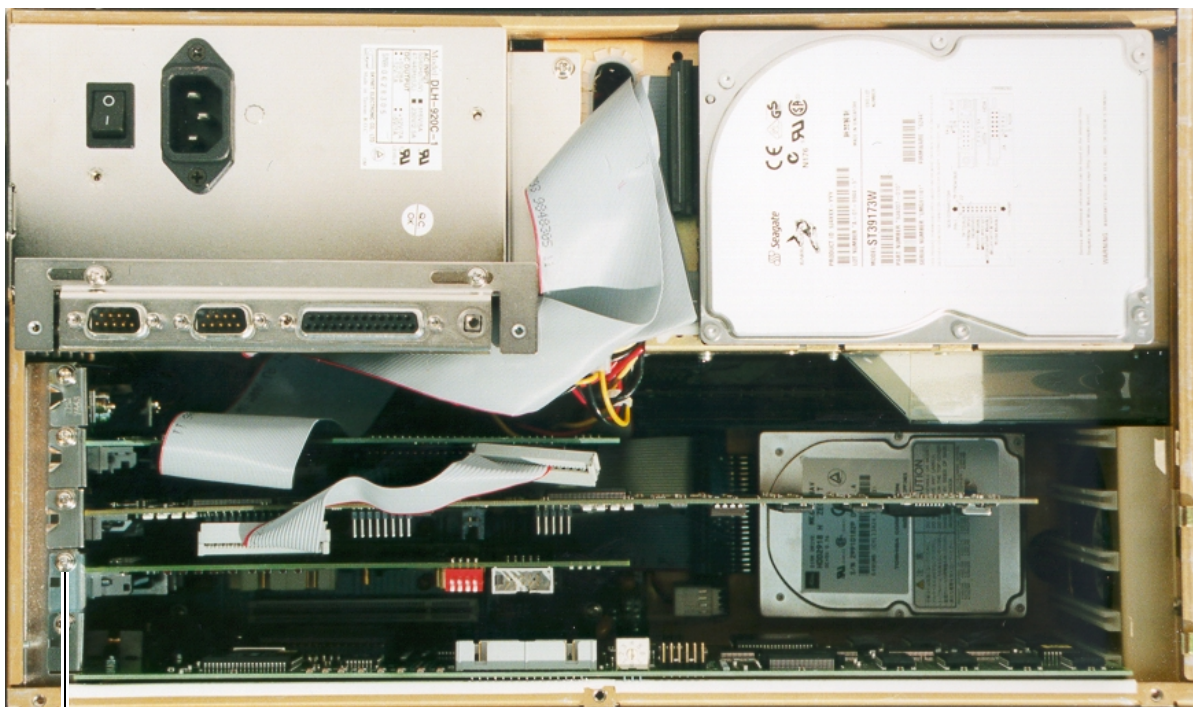
② If your MPEGscope has a Real-time Analyzer, disconnect the ribbon cable connector from the Real-time Analyzer card. The cable runs from the MPEGscope main card to the Real-time Analyzer card.



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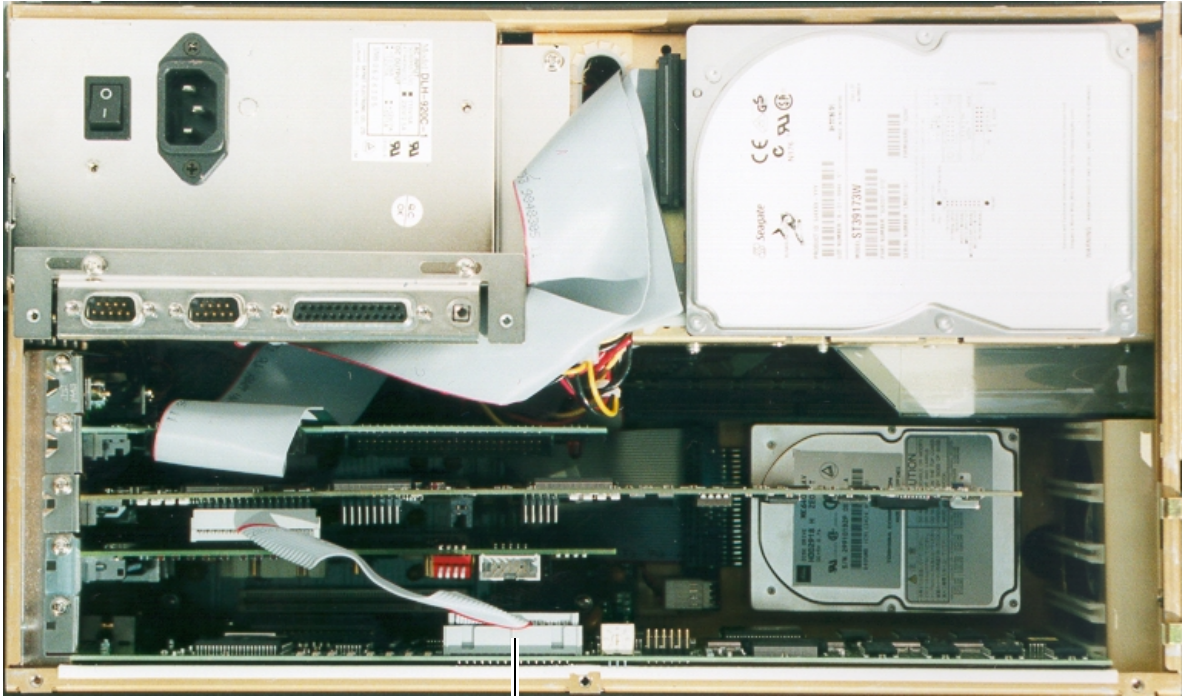
### Step 3: Install SMPTE interface

**IMPORTANT:** ① Attach the antistatic wrist strap to your wrist and to the PC chassis as described in the instructions on the envelope. Ensure that the copper foil end of this strap attaches to an electrical ground.



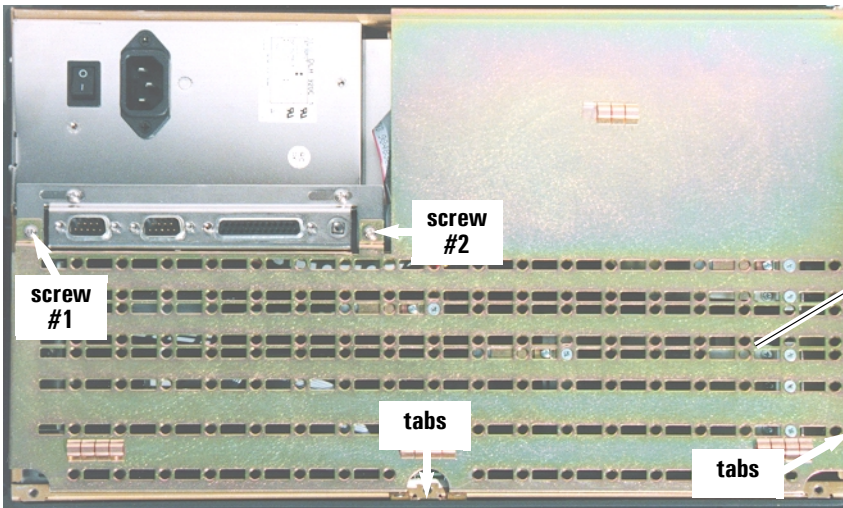
② Install the SMPTE 310M interface card into slot 2 and screw the faceplate to the PC chassis. (If this is the first interface installed into slot 2, you will have to remove the blank faceplate first.)





- ③ If your MPEGscope has a Real-time Analyzer, reconnect the ribbon cable from the MPEGscope main card to the Real-time Analyzer card.

## Step 4: Replace the cover

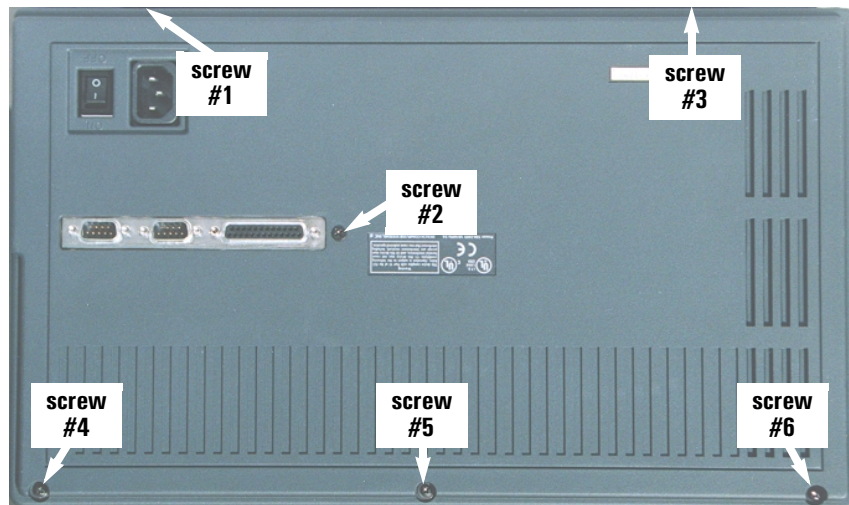


- 1 Insert tabs on the sides of the metal shield into the slots on the outer frame, then replace the two metal shield screws.

- 2 A plastic guide for the MPEGscope main card is located on the *inside* of the metal shield (by the third plastic guide screw). Use a small screwdriver to push down the plastic guide until the edge of the MPEGscope main card is engaged in the slot on the guide.

- 3 Place the back cover in position and replace the six back panel screws.

- 4 Reconnect your display, power cables, and LAN connection, then power on your MPEGscope Portable.

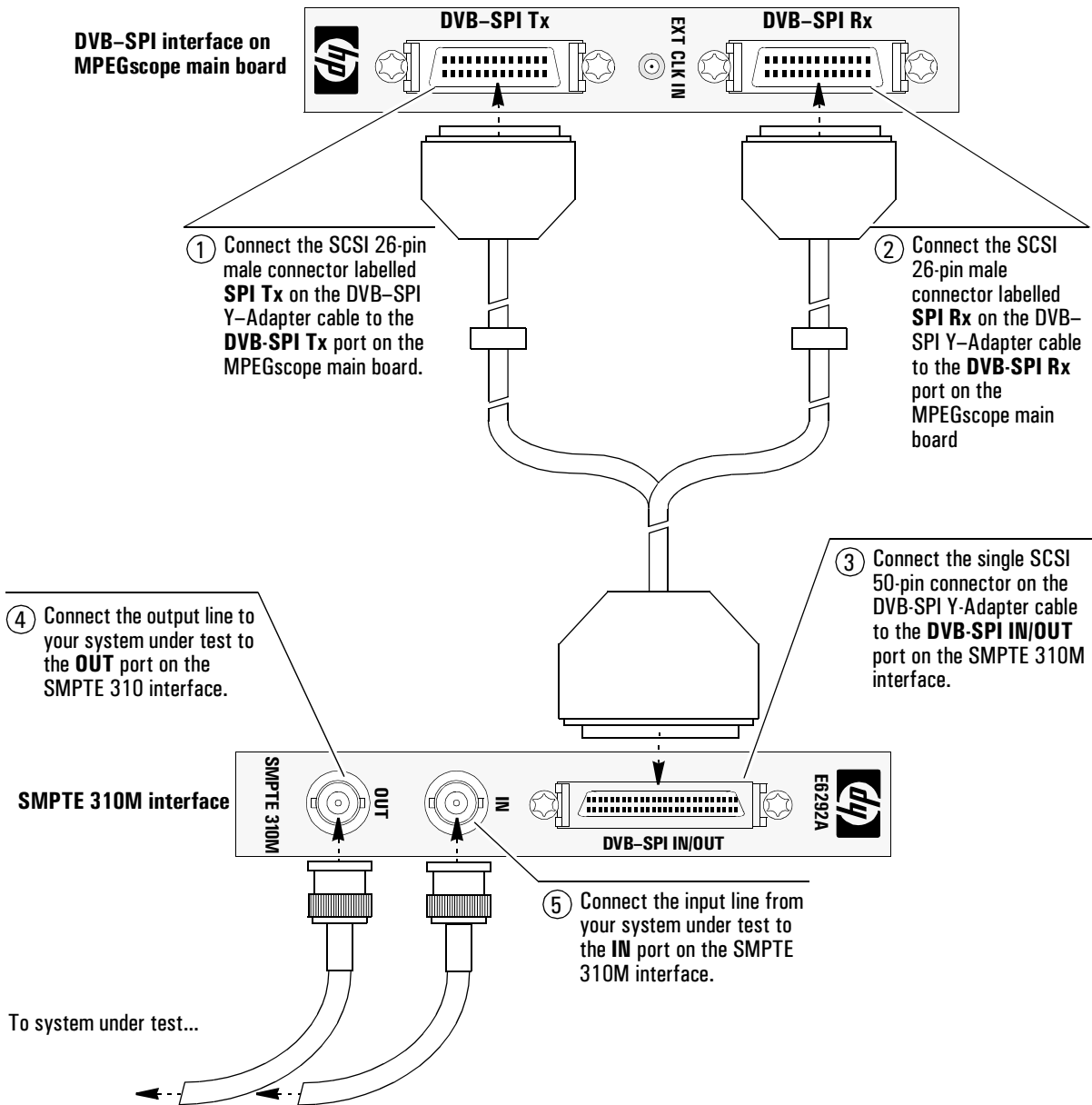


E6300A MPEGscope Portable with SMPTE 310M interface installed

SMPTE 310M interface installed in slot 2.



## Connecting to the SMPTE 310M interface

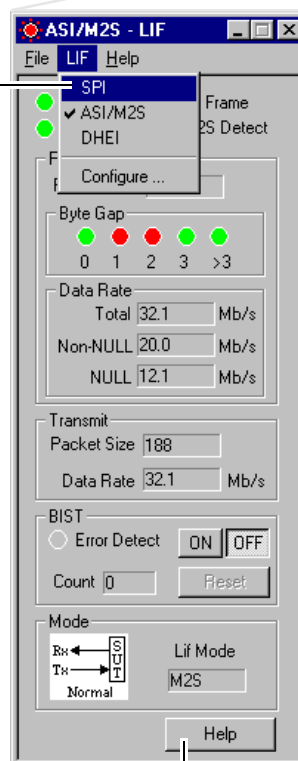


## Configuring the software

Because the SMPTE 310M interface receives and transmits data via the MPEGscope SPI interface, you do not need special SMPTE 310 interface software. You can set receiver and transmitter options from the SPI interface application, as illustrated below.

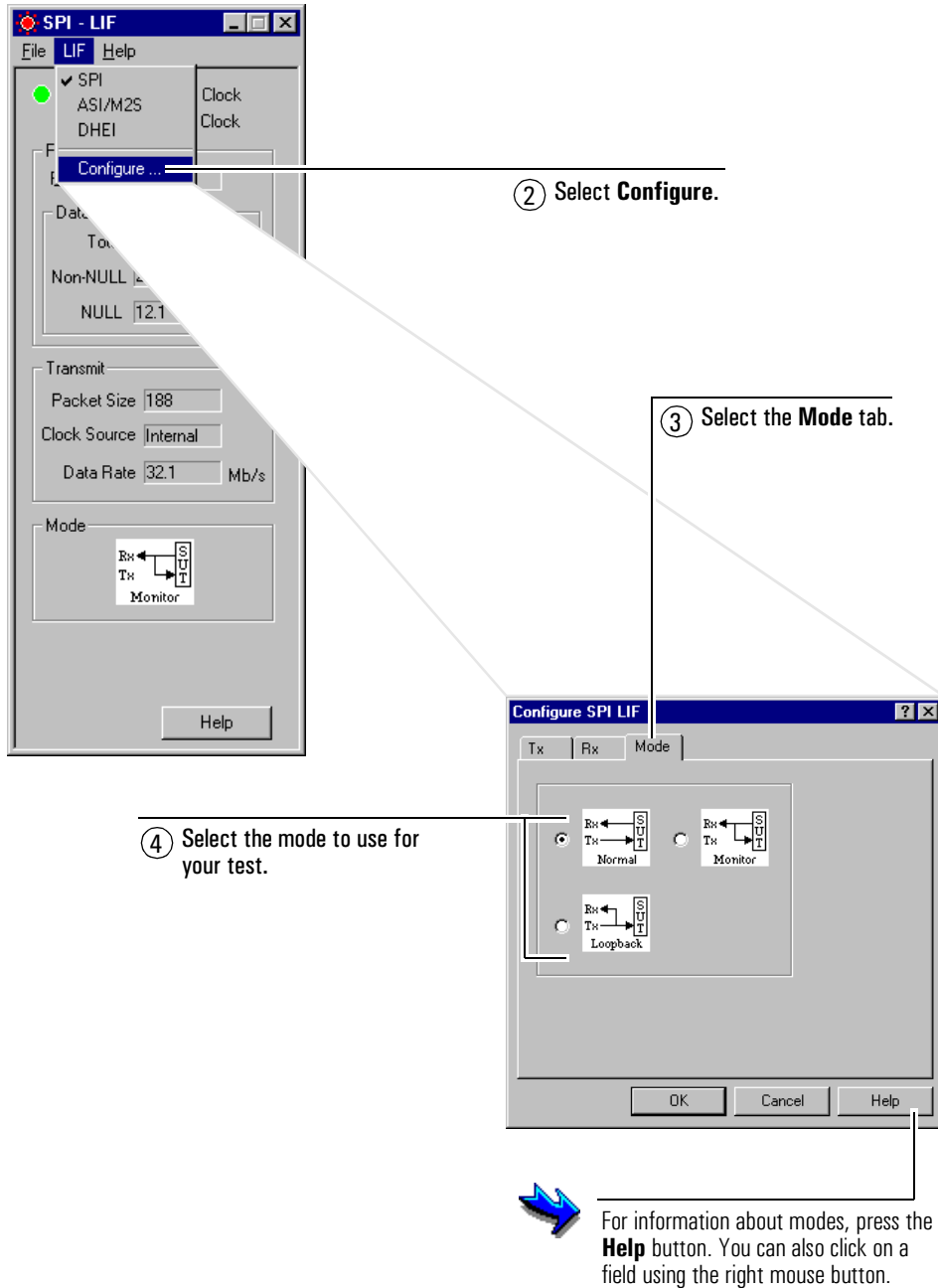


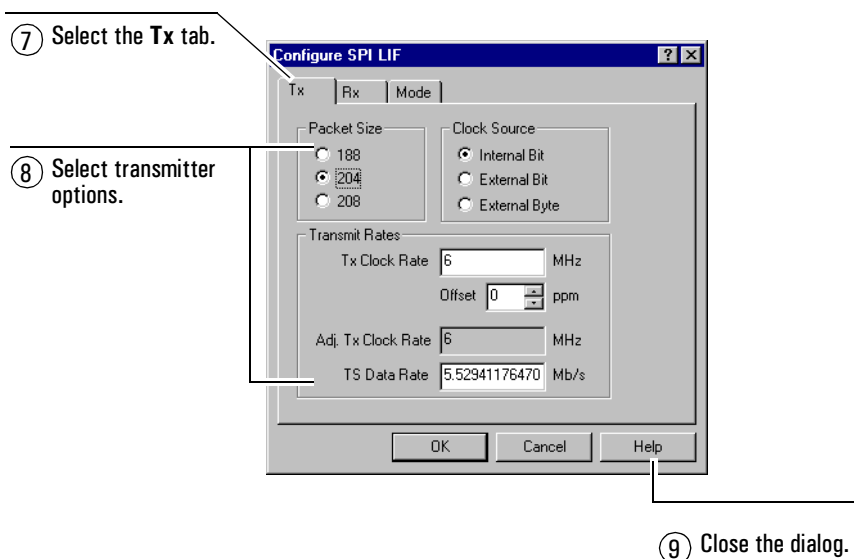
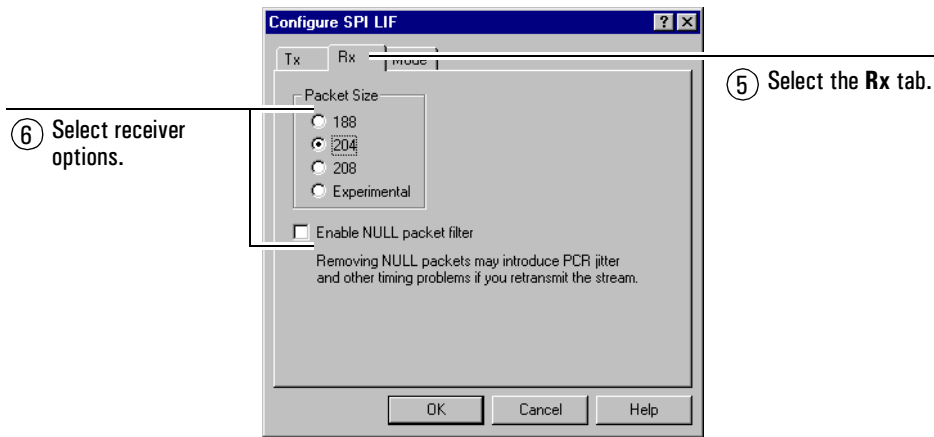
① Select the SPI interface.



For information about this dialog, press the **Help** button.

## Configuring the software





For information about receiver and transmitter options, press the **Help** button at the bottom of the dialog. You can also click on a field using the right mouse button.

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## SMPTE 310M interface specifications

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<b>Type</b>	Biphase mark
<b>Maximum line rate</b>	40 Mb/s (Minimum receive and transmit rate is 16 Mb/s)
<b>Timestamps</b>	Packet timestamp clock: 10 MHz +/- 5 ppm Resolution of timestamp clock: 100 ns Packet timestamp sampling is accurate to within +/- 1 timestamp clock period between consecutive packets
<b>Electrical Spec</b>	800 mV pp (nominal)
<b>Connector Type</b>	75 $\Omega$ BNC
<b>Standard</b>	SMPTE 310M Standard, Sept. 98
<b>Part Number</b>	E6292A

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### WARNING

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To ensure the Electromagnetic Compatibility (EMC) of MPEGScope, use shielded cables on all interfaces.



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## Release Notes

This section describes two SMPTE 310M interface constraints that may affect your test. It includes a description of the problem along with a simple solution or workaround.

### Initial startup with sparse streams

Upon initial startup or when you make a large bit rate change, the SMPTE 310M receiver may not synchronize if the stream contains large continuous strings of 1's or 0's. This could happen if you are receiving many NULL packets with an all-1 or all-0 payload (for example, from an idle SPI transmitter). You will notice many **Rx Psync** and **Rx Clock** errors from the **SPI LIF** dialog.

The problem occurs because the stream does not contain enough variation in bit values for the SMPTE 310M interface to unambiguously determine the bit rate. For example, it will not be able to differentiate a stream consisting of all 0's at 40 Mb/s (where the bit has one transition) from a stream consisting of all 1's at 20 Mb/s (where the bit has two transitions).

The solution is to play a stream that contains transport stream packets carrying real data until synchronization occurs. Without changing the bit rate, play the original stream again. The SMPTE 310M interface will remember the bit rate and correctly synchronize.

### Large bit rate changes

Because the SMPTE 310M interface implements a wide-band clock recovery circuit, large bit rate changes (greater than 1 1/2 times the original rate) may cause the SMPTE 310M receiver to lose synchronization. For example, this could happen if you change from a bit rate of 22 Mb/s (with the interface correctly synchronizing) to a bit rate of 40 Mb/s. If this occurs, you will notice many **Rx Psync** and **Rx Clock** errors from the **SPI LIF** dialog.

You can avoid this situation by first changing to an intermediary value (for example, 30 Mb/s). Once the interface is in synchronization, increase the rate. Alternatively, you can disconnect the cable for a brief period, then reconnect it. The SMPTE 310M interface will achieve synchronization after a few seconds.

If the problem still occurs, you may be receiving large continuous strings of 1's or 0's. As described in the problem above, play a stream containing real data at the desired bit rate, then play the original stream again using the same rate. The SMPTE 310M interface will remember the bit rate and correctly synchronize.

